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TOMORROW — THE ENGINEER'S ERA — PAGE THREE

WSE MEETINGS — PAGE TWO

Vol. 7 JANUARY, 1955 No. 8

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84 E. Randolph Street
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Published Monthly
BY
THE WESTERN
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AT
84 EAST RANDOLPH STREET
CHICAGO 1, ILLINOIS

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Single Copy ..... $ .50
Annual subscription 4.00
Foreign subscription..... 6.00

Entered as second-class matter at the post office at Chicago, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

JANUARY, 1955 Vol. 7, No. 8

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COVER STORY

In the middle of January, members of the Western Society find themselves suddenly whisked away to the hinterlands of Mexico for a gay fiesta. If queried on how they got there any one of them might well reply, "by the magic of a spell cast by R. H. Bacon, the guiding spirit of the occasion." That answer would probably be accepted at the time. Later, however, heads cooler from the diminishing effects of hot-seasoned dishes might want a more scientific answer. Well, your editor knows how you really got to Mexico: on one of the all-weather Mexican highways, such as shown on the cover.

—Picture courtesy Pan American World Airways

January 24, Joint Meeting, ASTM-WSE

Speaker: Norman L. Mochel, president of the American Society for Testing Materials, and manager, Metallurgical Engineering, Westinghouse Electric Corporation, Philadelphia.

Subject: "Power and Materials, Now and in the Future." Mochel is intimately acquainted with his subject. He not only faces the problems of metals and materials daily in his work, but also has written many technical papers on them and related areas. In his talk he will also discuss certain aspects of nuclear energy and will analyze problems of marine power. The atomic submarine *Nautilus* is only now setting out for her sea tests. This makes the speaker's subject especially timely.

Cocktail Hour, 6:00 p.m.

*Special Dinner, 7:00 p.m., price $3.50.

Meeting proper, 8:00 p.m.

*Dining room reservations are necessary.

January 26, Noon Luncheon Meeting

Speaker: Gail Brook Burket, prominent writer and a gracious woman.

Subject: "You Can Write a Poem." All through your engineering courses, and ever since, you have been told that you should learn more about the arts and literature. Well, here's an easy, pleasant, and sensibly way to start. Why not give "Poetry" a chance to prove itself. Afterall, it must have something to offer: its been around for several thousand years. Why not come to this meeting if only to make sure you don't like poetry. Either way you'll have fun—and an interesting time. And who knows? Maybe you *can* write a poem.

February 1, Mechanical Section Meeting

Speaker: Dr. Stephen J. Fraenkel, manager of Propulsion and Structural Research Department, Armour Research Foundation.

Subject: "Out of This World." The department which Dr. Fraenkel heads, concerns itself with guided missiles and rocket research, effects of impacts and explosions, and evaluation of capital structures. Of course, space travel by humans is not yet an actuality. But rockets and guided missiles, such as *Nike,* are with us, giving us conflicting emotions of security and anxiety if we read the newspapers and magazines too avidly. This talk may be described as one by an engineer looking at space travel with a view to problems of material selection, power plants, structural design and control. Although this is a Mechanical Section Meeting, all members are invited, in fact encouraged to attend.

February 2, Noon Luncheon Meeting

Speaker: Clifford Grout, division representative, Private Wire Services, Western Union Telegraph Company.

Subject: "Private Wire Services." Grout will discuss various types of private wire services with special emphasis on facsimile telegrams and out of the ordinary uses of "Intrafax." This is a direct, dry-recording process of facsimile in which the received copy is immediately available for use without developing, drying, or needing further processing. Demonstration equipment will be placed on the luncheon tables so that facsimile telegrams, sketches, or drawings in their own hands may be sent by the guests at one table to those at another.

February 9, Noon Luncheon Meeting

Speaker: Ernest L. Korb, sales manager of Wholesale Marketing Department, Pure Oil Company.

Subject: "I can get it for you 'Wholesul.' " This interesting talk will be constructed around new and ever-expanding markets for petroleum and related products. Special emphasis will be put on methods used to satisfy demands for large-volume chemicals such as Low Pressure Gas.

February 14, WSE General Program

Speaker and subject not available at this time. They will be announced in the near future.

February 16, Noon Luncheon Meeting

Speaker: Louis Ancel, corporation council, Village of Maywood.

Subject: "Metropolitan Water and Sanitation." This is a timely and controversial subject, especially in a huge industrial area of high population such as in and around Chicago. The problems are tremendous—the conflicts in interests are numerous. Ancel, the speaker, though a member of the governor's committee to study the matter, did not sign the report which proposed a sanitary district with expanded scope and powers. Was he right in doing so? Was he wrong? Attend this meeting and get a better insight into this problem.

John C. Sharp (left), speaker, shown at stand with John F. Sullivan, Jr. (right), WSE president.

Tomorrow – The Engineer's Era

This is a very pleasant experience for me tonight. The opportunity to be associated with a group of technical men; to hear a language with which I am familiar, and to feel again, that I am a member of a wonderful profession, is very stimulating. I noted, with particular interest, the festivities before dinner. I used to envy my brothers in the sales profession, especially when they had a convention.

Those hard working gentlemen would return from a meeting with sore right arms, bleary eyes and fallen arches. Their stories about writing notes, looking at charts and standing on their feet all day in educational exchange of ideas were received with considerable skepticism. We claimed that the bending of elbows, the watching of floor shows and the playing of 36 holes of golf were the causes of their infirmities. But apparently the engineers have adopted considerable of the techniques of the sales boys.

My pleasure is somewhat tempered by the knowledge that I have to make a talk tonight. When I went to school, any engineering student who thought of taking public speaking was subject to suspicion. As a result, I come before you tonight ill-prepared in the art of oratory. Consequently, we shall keep this on the basis of a low-pressure discussion.

The subject, "Tomorrow, The Engineer's Era" is challenging, broad and full of implications. Boiled down, it implies that the engineers are going to take over. That is quite an assignment and will take considerable doing. I think we should discuss whether we are being forced to take over, or are trying to take over, or can we take over?

In the first place, how did previous historical eras happen? An aggressive nation could conquer the then known world and you had the Persian, Grecian or Roman eras. As the known world grew in size, it became impossible to impose one government over its entire boundaries.

But there were other types of eras. The Dark Ages and the Renaissance were classed as eras of culture. Certain periods of time in British history were described as the Elizabethan or Victorian eras. These lasted only as long as the life of some powerful public figure, or as long as a dynasty continued aggressive and pure in aims, or as long as some other idea did not develop which was more attractive. Even the glaciers of the Ice Age melted and retreated to insignificance with a change in some meteorological condition.

But now we hear that tomorrow will be the day of the engineers. It is, first of all, necessary that we decide when is tomorrow. Is it 6 hours from now, or is it manana—that indefinite tomorrow of the Latin American? Or was it yesterday? There are some who think the engineering era is here. Certainly, there are more varieties and numbers of engineers than ever before.

Fortunately, this association is relatively ethical in the application of the term, "engineer." Sometimes, I wonder if the term, "engineer" is not doomed to generic dilution. I am proud to be classed as an engineer, but the day they call a banker a "money" engineer, or a doctor a "flesh" engineer, I'll renounce all claim to the title. I have already received one severe shock—that was the time I had my son take an aptitude test. I wonder what I would have been today had I taken an aptitude test?

Reared in a small country town, my acquaintance with engineers was limited to those sterling characters in boys' books. They wore big hats and laced boots, and built railroads and bridges through jungles. Or they invented and constructed wonderful machines for which they received riches and acclaim from the world.

Perhaps it was the desire for a pair of high laced boots, which I never owned, or maybe it was the attraction of the decrepit locomotive on the branch railroad, but somehow I ended up taking engineering. And if this sounds silly to you, I have heard even worse from ap-

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Mr. Sharp, president, Hotpoint Company, presented this address at The Annual Fall Dinner of the Western Society of Engineers on Nov. 29, 1954, in Chicago.

plicants for jobs in our engineering department.

In any event, since the time I had made my decision, until it came time for my son to prepare for a profession, science had come up with the answer—the aptitude test. So the boy took it. He had good mechanical abilities, was good enough in mathematics, could reason with some logic but, lo, he comes out with a top rating as a potential undertaker! This shocked both of us and convinced me that engineers are made and not born. Perhaps, he should have chosen to be an engineer of cadavers, but he decided on general engineering. Since this classification is new since my day, I am wondering if he will come out of school as an engineer of generals.

Joking aside, I feel that the era of the engineer will not arrive until all human beings have some understanding of engineering principles. By the same token, this era will not arrive until all engineers have a better understanding of human beings.

You see, you can classify everything in the world into two broad categories —*Things* and *People*. *Things* and *People*. We work with both. One, Things, respond dumbly to scientific laws and, fortunate we are, that they do so. The other, People, respond to an attitude, an idea or ideal, an emotion, a challenge or many other influences.

The one big problem we have to solve before we have an era in which people live under influences, or plans, which are developed by engineering and engineers, is to recognize this difference and to reconcile and compromise these differences.

We must not put reliance on Things. Hitler tried that. Germany was, unquestionably, the leader in science and engineering prior to the last war. But its efforts were directed to developing Things, primarily to further Germany's physical conquest of more Things. People were treated as Things—as mere tools to assist in Hitler's dreams of expansion.

The great scientific and engineering developments that have taken place here in the United States in the last 10 years might lead us into the trap of forgetting which comes first—which is the master and which is the servant.

I can cite two simple laws which we learned very early in our studies and show where one had to be discarded by society and one, which is not being utilized, although it must be.

The first is the simple law concerning action and reaction. Prior to the establishment of law for humans, as we know it today, the law was an eye for an eye and a tooth for a tooth. Any man who was injured could collect damages in kind from him, who inflicted the injury. If he was killed, his survivors had the right to the aggressor's life. Here was a law that would not work in civilized society although, today, we see reparations and other forms of retribution in effect. Perhaps these are satisfactory as they are assessed under some form of law.

Then we have the old law of conservation of energy. This is one that the labor unions and various political groups are refusing to recognize. When there is an attempt to get something for nothing, this law eventually takes over and extracts payment from some one, usually not the true debtor.

From these rathered scattered and, I am afraid, remote illustrations, I am trying to bring out that we face a dilemma. As engineers, we see that our

(Continued on Page 13)

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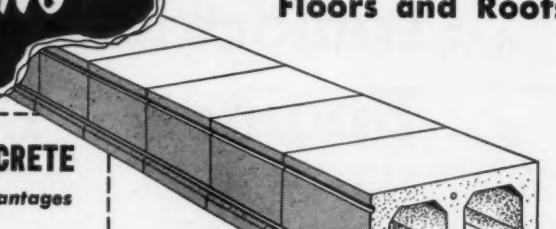

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Junior Engineers:

How to Recruit and Train

By C. J. Cox

Owing to the current shortage of engineers, young graduates find themselves in a buyer's market where, apparently, they need only to wait effortlessly for the best offer from firms having jobs to sell.

Competition in Recruitment. In the spring months of 1954, no less than 110 companies sent recruiters to Louisiana State University to interview 15 prospective civil engineer graduates in the June class. Approximately 300 firms and Government agencies were scheduled to visit the campus of the University of Illinois to interview 145 engineering students of the February 1954 graduating class. Recruiting officers reported that the Deans of the Engineering Schools were concerned about the general lack of interest on the part of students in signing up for employment interviews, and that the indifference is causing recruiting trips for many large and well known firms to be cancelled.

Competition for the services of the young engineers is proportionately the same at small colleges as at the larger institutions. Students have their choice of varied engineering positions with every type of firm or industry imaginable throughout the country. Some 400 companies sent representatives to the campus of the Illinois Institute of Technology, which ranks first in numbers of engineering students, and each graduate of the June 1953 class was interviewed an average of eight times.

How long the shortage of engineers will last is a moot question. The manpower market tends to right its own balance when it begins to tip too heavily to one side, because a shortage in any occupational area makes wages and salaries skyrocket; in turn, that area becomes the focal point of endeavor, especially for young men just embarking upon careers. The shortage of professional engineers may be safely predicted to continue until technical training can be acquired by students presently in high school with at least four years of college work still ahead of them. However, enrollment in freshman engineering classes at some of the largest institutions has doubled within the past three years and is not likely to decrease so long as salaries remain high.

	Electrical	Mechanical	Civil	Industrial
Highest	$385	$354	$385	$325
Lowest	261	275	299	300

Salaries. The salaries being offered to engineers with Bachelor of Science degrees but no experience by private firms and public agencies other than the Federal Government upset all traditional ideas of proper remuneration for beginners.

The average starting salary for the June 1953 graduating class at Illinois Institute of Technology reached an all-time high of $362 per month, which was an increase of $20 per month over the average starting salary of $342 per month of the February 1953 class. Top salaries were offered to architects at $399 per month, followed by mechanical engineers at $377; electrical engineers, $371; industrial engineers, $370; and civil engineers, $367.

High salaries are not confined to the North and Midwest. Southern schools, in Alabama and Louisiana, also reported beginning salaries of engineer graduates ranging from $360 to $400 per month.

The Illinois State Employment Service compiled for the Chicago District, Corps of Engineers, a table of minimum rates of pay in 22 States from California to Connecticut, as shown in the current biweekly State Job Inventories of these States. The national minimum average entry rate is $313 per month, though most commitments are made at approximately $350 per month. Above are the highest and lowest monthly salaries for graduate engineers with no experience as listed in this tabulation (See above).

The Federal Government, having a pay scale prescribed by Congress and the Civil Service Commission, cannot successfully compete with private industry for the services of young engineers to whom salary is the decisive factor in planning a career.

The following table compares average starting salaries, over a period of 15 years of engineering graduates from the Illinois Institute of Technology with beginning monthly salaries in the Federal Government for junior engineers having Bachelor of Science degrees but no experience (See below).

Year	I.I.T. Graduates	Federal Government
1953	$362	$284.16
1948	265	247.90
1943	169	166.66
1938	100	166.66

C. J. Cox, the author of this article, is a member of the Civilian Personnel Division of the Office of the Chief of Engineers, D. A.

From the standpoint of salary, the best that can be said for the Federal Government in comparing the figures above is that although salaries do not soar so high in good times, neither do they fall so quickly in hard times. The argument, however, is not particularly effective in recruiting young men who have not sought work during a national depression. Fortunately, salary is not the only factor.

Factors of Choice. A Corps of Engineers recruiting officer for the Chicago District makes the following pertinent comments: "One gets the impresson from talking to the students that salary is not the primary factor in their consideration. Naturally, they expect a salary that is "in line" with what is being paid elsewhere. Type of work and type of experience seem to be the primary factors for taking jobs. The reaction of students indicates that the activities of the Chicago District offer a wide variety of engineering experience which appeals to the majority of the students interviewed during the past two and one-half years. During the current recruiting trip practically all of the students interviewed inquired as to the type of training they receive. . . .

"Another important factor in the engineer recruitment picture today is the fact that the majority of the graduates are subject to military service upon graduation. For example, 60% of the June 1953 graduating class of about 300 students at Illinois Institute of Technology were subject to military service. The majority of private firms are following the practice of the Federal Government in offering job tenure and seniority in the event of military service. Even so, the average student who is subject to military service upon graduation is in a rather confused state of mind as to what his professional future as an engineer will be. . . . The factors mentioned above, together with geographical work location and previous summer employment with the firm are probably the major factors affecting the engineering graduates' selection of employment."

Training. The Corps of Engineers has the dual obligation to keep its military and civilian strength to effective working levels, holding each group in proper relation to our national defense and our national economy. Currently, 7,650 civilian engineers are employed in continental United States and 250 more overseas. Some 8,000 reserve officers are on active duty, and there are 2,061 regularly commissioned officers in the Corps. The total number, nearly 18,000, is 4½ percent of the number of professional engineers in the United States, which according to census figures is approximately 400,000. Training these forces for maximum usefulness to the nation in war or in peace is an objective plainly envisioned though slowly attained.

Training Junior Engineers. For the past several years a number of Engineer Districts have been rotating newly appointed engineers through a wide variety of assignments to give them a general familiarity with the work of the installation. Recently, the program has been revamped for nation-wide adoption in the Corps of Engineers. Rotational assignments in the areas of design, construction, and operation for a period of two years give the junior engineer opportunity not only to familiarize himself with the widest possible scope of work in the District to which he is assigned, but also to evaluate his own engineering aptitudes before accepting

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his permanent assignment. He may have a degree in civil engineering with rather vague ideas of what he can do best; after working on the job, he may decide that he wished to specialize in design, or in soils, mechanics, or in operations.

As of 30 June 1954, approximately 75 newly appointed graduate engineers were commencing the new program of rotational assignments. By agreement with the Civil Service Commission, engineering graduates without experience may be appointed at GS-5 grade, $3410 per annum, and after 6 months of rotational assignments successfully completed and demonstrated competency, be promoted to GS-7, $4205 per annum.

Another plan under consideration is a program of rotational training for selected engineer graduates during a portion of their military service or prior to an impending draft in order to utilize their special training for the defense effort and also to give them a sense of continuity rather than one of halted progress in their engineering careers.

Summary. Competition for the services of engineer graduates is evinced by the hundreds of firms that send recruiting officers to universities to interview the students. Minimum entry salaries for inexperienced graduate engineers average $313 per month, but the national average commitment appears to be nearer $350. Factors balancing the high salaries in determining job acceptance appear to be the type of training offered, geographical work location, and previous summer employment. The Corps of Engineers has adopted a nation-wide program of rotational assignments for newly appointed junior engineers.

Architect Club Makes Tuition Grants

A $500 annual scholarship program has been established at Illinois Institute of Technology, Chicago, by the Architects Club of Chicago.

Eligible for the two $250 tuition grants each school year are students of sophomore standing or higher in Illinois Tech's department of architecture, whose director is Ludwig Mies van der Rohe.

First year architecture students will not qualify for the awards because they are eligible for freshman competitive scholarships given by Illinois Tech.

This year's winners will be chosen soon by the IIT scholarship committee, which may renew grants to former winners in subsequent years or may elect new recipients each time under the program.

Leedy Says Output Will Double by 1975

Output per man hour and resultant buying power will more than double by 1975, it has been predicted.

The future of American industrial progress is much more world-shaking than current conservative estimates indicate, according to Dr. Haldon A. Leedy, director of Armour Research Foundation of Illinois Institute of Technology, Chicago.

Dr. Leedy believes that most guesses into the future are not as optimistic as they might be because they are based on thinking which is too conservative.

For instance, he said, a graph showing a 100 per cent increase in the standard of living over the past 25 years has lead some to predict that merely another 100 per cent increase would occur by 1980.

But if the rapid acceleration of the rate of progress were projected into the future, the same trends might be extrapolated to show a much more impressive outlook.

Supporting his optimistic forecast, the research director pointed out that spending for organized technological research this year was stepped up even in the face of a slight business recession.

Of several scientific fields to receive greater research emphasis in the coming year, Dr. Leedy singled out nuclear energy, automation, electronics, and human engineering.

"It is not improbable to guess that this generation will live to use the electrical power and myriad other benefits derived from widespread nuclear reactors and atomic power plants."

He said Armour Research has cemented its plans to construct at its south side Chicago headquarters the first reactor for industrial research.

This and other contemplated research reactors may revolutionize our living conditions "within a comparatively short time, since there is virtually no branch of technology which will not be affected," he said.

Machines to translate languages, magnetic "memory" tapes that automatically link industrial processes, and calculators that simplify routine office accounting problems are only a few of a long series of developments to be perfected in the field of automation.

More of the advances in automation electronics and mechanics next year will be directed toward business offices, where the expensive bottlenecks of record keeping and accounting already are beginning to be broken, Dr. Leedy explained.

In other fields of electronics, he prophesied that much of the research will be devoted to design for maintenance. He envisioned television sets, radios, hearing aids, and household equipment with a greatly increased life expectancy.

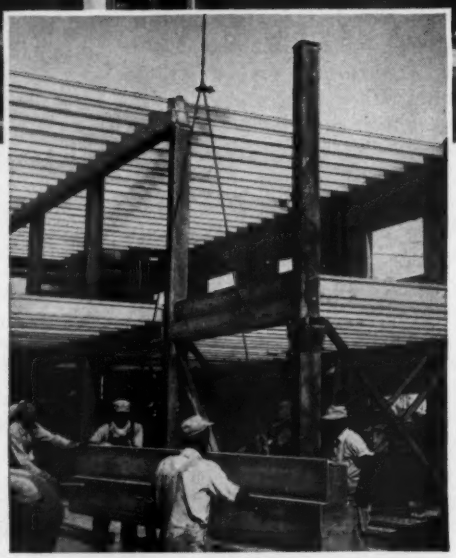
"Printing of electrical circuits to eliminate the complex 'rat's nest' of wires found in most radio and television equipment, and a stepped-up use of transistors to replace vacuum tubes will enter the research picture next year (1955). These and other research developments will serve to make such appliances smaller and less expensive," he added.

Human engineering—or fitting the machine to the man—is another area that will concern industrial and governmental research more and more in 1955, Dr. Leedy believes.

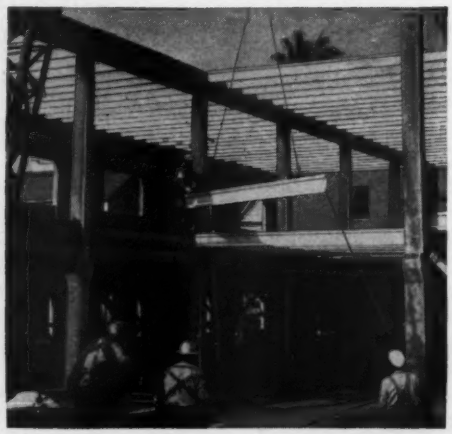
For the distant future, Dr. Leedy pointed to food technology as another field to undergo a transformation through research and development. He saw the ocean as an increasing source of food where great "farms" of plankton and algae one day might supplement inland harvests.

The Armour Research Foundation director attributed the better products, processes, and materials of the past and future to organized industrial research, which he termed "an economic necessity for virtually every progressive industry."

Dr. Leedy felt the present high level of industrial research would continue at about the same level during 1956, but with an increasing industrial, and decreasing governmental, support.



Large photo, completed building. Above: Placing a roof girder. Below: Placing a precast floor joist. Alec Arany, engineer; John K. Minasian, consulting structural engineer; J. A. McNeil Company, Inc., contractor, all of Los Angeles.



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Engineers Peer into the Future at Power Show

A long line of newly developed equipment, displayed during the week of Nov. 27 at the 21st National Exposition of Power and Mechanical Engineering, forcibly demonstrated the accelerated pace at which industry is carrying on. New designs, such as formerly required years to develop, are now being brought into production in months by some of the larger manufacturers.

The exposition was held as heretofore under the auspices of the American Society of Mechanical Engineers, and management of the International Exposition Company of New York, and staged at the Commercial Museum in Philadelphia for the first time.

The A.S.M.E. held its 74th annual meeting in New York the week of Nov. 27 as constitutionally provided, a delegation of several hundred members visiting the exposition during the week. Continuance of the show Monday and Tuesday after the meeting, afforded opportunity for members to examine the exhibits in more detail.

Symbolizing 75 years of progress in engineering, the Society's exhibit at the Power Show featured a steam engine model of 1879 vintage or earlier, in operation along side the cut-away model of a gas turbine generator rated at 50 horsepower at 40,000 revolutions per minute. This little unit was designed for portable emergency power use.

Things to come in the everyday application of nuclear power were sharply outlined by several of related exhibits at the Show. Of primary interest were the Atomic Energy Commission's model of the first nuclear power station, and the Westinghouse Electric Corporation's schematic representation of the reactor-turbo-generator system that will feed power from it into the transmission lines of the Duquesne Light Company.

These models were released by A.E.C. for viewing by the largest audience ever to see such a display. The actual development of the first central-station, atomic-power plant has been under way since approval was granted by the Commission.

Of more immediate interest to scientists and engineers was the first offering of a basic reactor designed for selective application in nuclear research. This unique exhibit is a one-sixth scale model, complete in detail, showing a group of standardized conponents which can be assembled in various ways to serve stated purposes in nuclear research. The exhibitor is now ready to quote costs on the design and construction of reactors for projects approved by A.E.C. For the first time, industrial concerns, universities and research institutions will have a catalog from which to select standard parts for reactors to produce neutron and gamma rays, for isotope production, reactor technology, radioactive materials and for biomedical studies.

Advances in combustion engineering dominated the show and were brought into focus by the scale models of new power stations incorporating the latest concepts of design and equipment. One model showed the configuration of the 1954 extension of the Jersey Central Power and Light Company's Raritan River plant. This is the largest steam generating unit in the East utilizing cyclone furnaces. It is rated at 990,000 pounds of steam per hour at 2050 psig and 1050 F. A model of the Mitchell Station of the West Penn Power Company, revealed that that installation is fitted out with no less than 148,000 tons of copper condenser tubes.

The large number of boiler units at the show testified to the increasing demand for steam and hot water for processing and space heating. Typical "packaged boiler" units are completely self-contained, require neither special foundations nor stacks. They are fully automatic in operation, with push-button start and stop, and completely safeguarded. Oil or gas fuel is used and, where heavy oil is to be fired, self-regulating preheaters are furnished.

In one line the conventional design with central furnace surrounded by return fire tubes, is offered in 20 to 600 bhp capacities. Larger units, however,

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are of water tube construction up to 45,000 lbs per hour rated performance, but also unitized. In a second line, the two-pass design is also used, but with a "spinning gas" technique, whereby air is delivered to the burner through two rows of concentric air vanes, which impart opposite spinning motion to the inner and outer shells of the air stream. At the opposite end of the fire box nickel-chrome impellers at the entrance of each tube twirl the returning flue gases to provide direct contact with the heating surface. A third exhibitor offers 20 sizes of uniformly designed boilers ranging from 20 to 600 hp, featuring a three-pass design, while a fourth by locating the furnace in the lower part of the shell, has achieved a four-pass circulation of the hot gases.

A remarkable example of compact design coupled with self-regulation carried to the point of automatic starting and stopping, was the automatic "Watchman," developed to save idling costs on railroad diesel engine. This little package fits a space 18 x 25 x 39 inches, weighs only 250 pounds, and has a rating of 125,000 Btu's per hour on 1.25 ghp of fuel, with an overall efficiency above 80 per cent. It circulates heated water through the diesel engine jackets at 10 gpm, or thereabouts. The diesels, therefore, are always ready to start without warming up and need not be idled to prevent cooling off during layovers. Moreover, when the diesels would ordinarily run cool on light pulls, the "Watchman" cuts in to boost the cylinder wall temperatures and prevent excessive fuel consumption.

A large number of exhibits displayed boiler equipment and supplies, such as insulation, grates, and stokers, fire brick and insulation, as well as tubes, gates, gages, and all manner of controls. The latest development in water tubes for boilers, also applicable in a variety of heat-transfer units, is the internally-finned tube. This reverses the familiar application of extended radiation from the outside to the inside of the tube. In boilers, it raises the fire-side to water-side ratio from 1.1 to 4.5. "We have known for a long time what it would do," the exhibitor said, "but is also took a long time to find out how to do it." A special process for brazing the longitudinal fins inside the tubing had to be developed before the conception could be brought into successful production.

In steam equipment, major units in big plants, as well as minor auxiliary units, the display was satisfactory to a large group of visitors. One of the leaders in heavy equipment, with a background of more than fifty years in producing equipment, that is found all around the world, exhibited a self-cleaning condenser which it considers a major contributions to its field. This incorporates a sluice gate arrangement, which reverses the direction of flow, thereby flushing the debris from the inlet water box tube sheets and tube ends, saving hours of down time for cleaning the old way. The cleaning operation is now performed without pause in operation.

Public comfort as well as the protection of plant personnel, explains the exhibition of a number of dust collecting systems. In one, furnace gases are drawn through cones provided with small louvres through which the gases escape, while dust particles are carried through and trapped at the lower end. In others, the cyclone principle is employed in small sized multiple units in which dust separation is effected by tangential intakes, which set up powerful centrifugal forces. An elaborate system designed to protect heavily dusting processes, operates by means of a multiple screening and scrubbing cycle using sprays of water treated with a dust-wetting agent. One of the more elaborate systems employs electric precipitation in the removal of nuisance dusts as from powerhouse waste gases, but more particularly in recovering material of value, such as metallic fumes and dust from nonferrous smelting plants, carbon black from "furnace black" plants, sulphuric and phosphoric acid in chemical plants, and sodium salts in paper mills.

One of the major industrial organizations observed recently that an increasing number of customer equipment specifications were calling for mechanical vacuum pumps, rather than steam air ejectors to remove air and noncondensible gases from surface condensers. Its reaction was to develop a pump for that

(Continued on Page 17)

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News and Notes

Following a recent study of operations, the Library has found it necessary to revise its schedule of prices for photocopying materials in the collections. For the unit price of $1.40, seven pages or fraction thereof (instead of 10) of any article or book are supplied. Analysis shows that the majority of orders, being for articles of less than seven pages, will not be affected. New price lists have been sent out to all purchasers of photoduplication coupons, and will be supplied to any interested parties on request.

* * *

Statistics for determining work load in different operations within the Library are not complete in as much detail as we would like. Occasionally, we attempt sampling in order to determine the total volume of work in a given operation and to ascertain norms for individual work loads. One such sampling has just been completed for the Serials Record Section of our Acquisitions Department. Detailed statistics were kept for two week periods in January, April, July and October of this year to determine the number of pieces of serial publications received and handled each week. On the basis of this work sample, an average of 2,648 pieces of periodicals and other serial mail are received in the Library each week, and an average total of 137,700 pieces per year. Of these approximately 67 per cent are retained for the collections; the remainder are duplicates and are disposed of either through sale to dealers, exchange with other libraries or disposal as waste paper.

* * *

Currently on exhibit in the Medical Department are some 40 examples of antique spectacles, frames, and lorgnettes, loaned by the Uhlemann Optical Company. Made of rubber, steel, gold, amber, and other materials, they date from 1789. Included are types worn by eskimos (amber, with ground periphery), Laplanders and dolls. Early bifocals, a gold frame worn by Theodore Roosevelt, and some of the first glasses designed to shield the eyes in construction work indicate the variety of forms represented. Persons troubled by newspapers "printed in smaller type than they used to" will be interested in what such difficulties used to bring on.

* * *

Additional shelving installed in the Technology Department has been used to expand the number of available indexes and abstracts. Principal addition to the open shelves is the file of *Chemisches Zentralblatt*, and a number of other specialized sets will also be noted.

Centrifuge Casting Of Titanium Achieved

Production of the first successful true centrifugal casting of titanium has been achieved as result of metallurgical research at the Armour Research Foundation of Illinois Institute of Technology, Chicago.

Pouring of the first sound casting of this type followed studies conducted at the Foundation under the sponsorship of Wisconsin Centrifugal Foundry, Inc., Waukesha, Wis. A number of castings, weighing from 3.3 pounds to 9 pounds, have been produced.

Casting equipment and techniques were designed or supervised by Wisconsin Centrifugal Foundry.

Melting of the pure titanium by the new method prevents contamination from furnace and mold materials, according to Jack W. Giddens, ARF research metallurgist, and Donald H. Turner, assistant metallurgist, who developed the process.

One of the principal advantages expected to result from the development of centrifugal castings of titanium lies in the metal's resistance to certain types of corrosion, Giddens ponted out.

"This development," he stated, "opens a new field in the use of titanium castings. These castings can be used as sealing rings, bushings, and fittings in areas where salt water corrosion is a major problem."

Such uses might be as anti-corrosion rings for carrier-based aircraft, and as jet engine parts, Giddens added. Centrifugal castings of titanium have the advantage of a high strength to weight ratio, he said.

One of the principal stumbling blocks in making parts using titanium has been the difficulty encountered in melting and pouring the metal to produce sound castings, he stated.

He explained liquified titanium will attack nearly any other material, with the result that the casting will have a rough surface and contain impurities from absorbing gases from these materials.

Details of the process through which a solution to this problem was reached have not been released by the company.

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The Engineer's Era

(Continued from Page 4)

society, and the world, would be so much better off if it could be guided by the clear, logical thinking that goes into an engineering program. But, practically, we must admit that many of our laws of science are not applicable to People, regardless of their success with Things.

As for planning, that just does not work. No one man, nor a group of men, can plan all things for all people. The communists are trying it, and we must admit their present successes. But these successes are largely brought about by force, which eventually will surrender to the thinking of free men.

The communist organizer was promising a group of prospects virtually everything. His clinching argument was, "Come the revolution, you will eat strawberries and cream." One prospect demurred with, "But, I don't like strawberries and cream." Whereupon the communist organizer screamed, "Come the revolution and you'll eat strawberries and cream and like it." That is the sort of engineering era that will never arrive, because People must have their freedom of choice, even though it is apparently not best for them. If that freedom is surrendered, then education, growth and improvement stops, except for Things.

In one sense, the engineering era is already here. The evidence of this is the general attitude of the public toward nuclear fission. The public realizes that scientists and engineers have achieved a goal toward which they have been struggling since science was first recognized. The People are bewildered by their inability to understand this new giant and, consequently, are frightened. I think all of our scientists are concerned by their responsibility in releasing this new force, and some even feel guilty. The American people are basically sound in their judgment most of the time and do not need the scare stories that some of our leaders feel are necessary.

As a weapon of war, the nuclear weapon is terrible, but so was gunpowder, the machine gun, the dive bomber. It is just a matter of degree, and since all war is terrible, there should be no hysteria about a single weapon.

Nuclear fission, as well as chemical synthesis, electronics, and many other recent rapid developments, have made the engineer more and more essential as a public figure. A banker, lawyer, doctor, politician or a farmer cannot make an estimate, or even a guess, as to the value of development in one of these great new fields. Every day, large appropriations are being approved by business men on the word of the engineers that it must be done. The complicated and technical equipment has to be developed, designed and operated by technical personnel, at least through the initial stages. And with the continual rapid changes that take place, it is questionable if the operations can be taken over by unskilled help as is now common in most older industries.

But the old established industries are advancing so rapidly, and along such vigorous lines, that engineering science is more and more required rather than

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empirical methods. The investments are too high, and the dangers too great, to use less than the best trained men and the best equipment. Steam pressures, speeds, transmission voltages, frequencies, capacities, strengths of materials and many other characteristics are being increased so rapidly that obsolescence is commonplace.

The demands placed upon engineers, and for engineers, show no signs of diminishing. This all reflects in higher prestige and, all important, the pay check. Of course, the diverse fields that have opened up have led to great specialization. I do not consider this serious, as it is likely that the field that is now specialized will be broken into further specialized areas in the near future. The former specialist then becomes supervisor of a group of super-specialists.

Thus, we see that the public has become almost wholly dependent upon engineers for its well-being and continued advances. The lay public is so far removed from the engineering world that it has to put complete faith in the engineers themselves. This has resulted in better recognition and better pay, but also imposes greater responsibility. Does this mean that the era of the engineer is here?

The era of the engineer is here insofar as Things are concerned. The era of the engineer insofar as People are concerned, is not here. There is much to be done to bring this about. It would not be proper for me to make such statements, or call attention to the situation, unless I was willing to make some recommendations. I have a few, and they may not be practical, but I'll mention them here.

First, the engineering societies should be more concerned with social responsibility. The past 20 years have shown that if the citizens do not do their own thinking, there is a swarm of little busy bees ready to do it for them. Let no one think, simply because he is an engineer, that he is above politics, or that he can leave social responsibility to someone else.

Next, the engineer, himself, should reach for a broader base in the human area. Frankly, I believe that if it is necessary for a student doctor or lawyer to be educated in the humanities, then the engineer will be equally benefitted. Human behavior, economics, philosophy, social and political science should make a man a better engineer and, most certainly a better citizen.

We see the small liberal arts colleges struggling for existence. The technical schools are essentially large institutions with expensive equipment. A cooperative marriage between the two certainly seems logical and possible. Perhaps public speaking might be squeezed in and, certainly, more courses in English. As a reader of thousands of engineering reports, I can testify to that.

In the business in which I have been engaged for 25 years, it would be advantageous for the engineer to study women. This does not mean the usual extra-curricular courses, although they are very essential. As I remember it, a lot of the nights that I spent on sketches and reports might have been more profitable if spent with some of my business administration room-mates, studying this very interesting subject. Did you ever stop to consider that:

1. Women are beneficiaries of 80% of life insurance.
2. Women inherit 70% of the estates left by men and 64% left by other women.
3. They own 50% of the privately-owned stock of large corporations.
4. 40% of the income tax reports are filed by women.
5. Women account for more than 60% of the votes in national elections.
6. One out of three women is gainfully employed.
7. One out of three drivers is a woman.
8. One woman out of nine has an accident, whereas the record for men is one out of four.

It would seem, then, that some kind of education in this very important segment of the population would be very worthwhile. Perhaps, courses in illogic, in form and in color would be a start.

All of this leads to the conclusion that if the era of the engineer is to arrive, the engineer must become a "whole" man. In addition to the sound technical training that he receives, there are other attributes that he must be taught, or develop. Engineering is merely horse sense applied mathematically.

He must know the laws of science and the usual formulas used in his particular branch of engineering. At the same time, he must realize that human beings do not respond to either, in many instances.

He must not compromise with the truth, but must realize that compromises are always necessary if anything really large is to be accomplished in business, politics or a happy marriage. Black is not black and white is not white in these areas.

He will find a sense of humor invaluable, so that he will take his work seriously, but not himself.

He must be charitable and patient with those who do not have the knowledge that he possesses.

He must come out of his cell, which is too often walled by complete absorption in his work, and take interest and activity in civic and political affairs.

There are probably several other important attributes which, if acquired along with those previously mentioned, would make the engineer a whole man. I see evidence today in the younger men of being further advanced than we were at their age. When, individually, and collectively, the engineers perform, as they are fully capable of performing, then the era of the engineer will have arrived. Tomorrow is not too far distant.

Machine Design Meet To Be Held in April

A national machine design conference will be held at the New York University College of Engineering on April 6, Dean Thorndike Saville has announced.

The theme of the conference is "Product Consideration in Machine Design." It is part of the observance of the College's Centennial Year, which has as its theme "Teaching and Research Build the Future."

About 200 engineers are expected to attend the meeting in the Gould Student Center on NYU's University Heights campus, 181st Street and University Avenue, the Bronx. Co-sponsors are the Machine Design Division and the Metropolitan Section of the American Society of Mechanical Engineers.

Four papers by engineers and executives from various industries will cover such topics as materials selection, surface finish, and fabrication methods.

"As the industrial market becomes more competitive the designer must pay increased attention to the reduction of production costs without sacrifice of product quality," Professor Austin H. Church, chairman of NYU's department of mechanical engineering and conference chairman, has stated. "This conference is designed to offer practical ways to approach the problem."

Armour To Hold Welding Conference

The metallurgy of welding, brazing, and soldering titanium will be pointed up Feb. 8 and 9 at the first annual Midwest Welding conference at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Carl E. Hartbower, chief of welding section at Watertown Arsenal, Watertown, Mass., will discuss the subject at the two-day conference being sponsored by Armour Research Foundation and the Chicago section of the American Welding society.

Among the other welding researchers and users of welding processes to speak at the conference are:

E. C. Osborne, quality control manager at Caterpillar Tractor company, Joliet, Ill., who will discuss "Applying Quality Control Welding in the Heavy Equipment Field;" Theodore Gaynor, supervisor of the inside shops for Bethlehem Steel company, Johnstown, Pa., "How Welding Slashes Steel Mill Maintenance," and Perry C. Arnold, welding engineer at the Chicago Bridge and Iron company, "Building and Equipping a Welding Research Laboratory."

Orville T. Barnett, supervisor of Armour Research Foundation welding research, expects more than 250 persons interested in the various phases of welding to attend the conference. Sessions will be in the Chemistry building auditorium, 3255 S. Dearborn street, on the Illinois Tech campus.

The conference has been designed to be of value to researchers as well as users of welding processes, Barnett emphasized.

Most of the program will be devoted to reports on actual industrial applications of welding processes by persons who have shown ingenuity in their use, he explained. Some of the talks also will concern latest research findings in welding.

NS of PE Meeting To Be Held in Feb.

The annual spring meeting of the National Society of Professional Engineers will be held February 18-19 in the Hotel Charlotte in Charlotte, North Carolina.

The two-day conference will be devoted to discussions of current problems and developments affecting professional engineers. Reports of the progress of NSPE's national programs will be made by Society officers, according to Clarence T. Shoch, Allentown, Pa., national president.

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EJC To Hold General Assembly

For the first time in its history, Engineers Joint Council, composed of eight major engineering societies with a total membership of 170,000, will hold a General Assembly and a banquet. A day-long program of discussions of subjects important to the engineering profession will take place Jan. 21 in the Hotel Statler, New York City.

While a broad variety of topics will be taken up by the committees and speakers, the basic theme will be the increase of unity in the engineering profession. The comprehensive proceedings will include addresses at luncheon and dinner by nationally and internationally known figures.

Discussions will deal with the problem of engineering manpower shortage, employment conditions as they affect engineers, the national water policy which has occupied the Council's attention for several years, activities in specialized areas of engineering such as the industrial and peacetime phases of nuclear development, and, finally, the future usefulness of EJC to affiliate and associate societies.

Thorndike Saville, dean of engineering at New York University, is president of the Council, which will install new officers the evening of Jan. 21.

Objectives of Engineers Joint Council include advancement of the general welfare of mankind through the available resources and creative ability of the engineering profession; cooperation of the branches of the profession; advancement of the science and profession of engineering; development of sound public policies in national and international affairs wherein the profession can be helpful through the services of the members of the profession.

To achieve these objectives, the Council acts as an advisory and coordinating agency to seek and study matters of mutual interest to the constituent societies in instances in which these societies desire such joint representation; it administers, on behalf of the engineering profession, activities authorized by a majority of the constituent societies of EJC.

ASTM Sets Jan. 31 For Committee Meet

The American Society for Testing Materials will hold its annual Committee Week January 31 to February 4 at Cincinnati, Ohio. Headquarters for the meeting will be at the Netherland Plaza Hotel; and arrangements have also been made with the Terrace Plaza, the Sheraton-Gibson, and the Sinton Hotels for additional rooms to accommodate the large number of members, committee members, and visitors. It is expected about 1250 will attend. About 30 of the Society's 75 committees have indicated their intentions of meeting during Committee Week. There will be a total of about 300 committee and subcommittee meetings spread over the five-day period.

A symposium on "Basic Effects of Environment on Strength, Scaling, and Embrittlement of Metals at Elevated Temperatures" will be held at two sessions, morning and afternoon of Wednesday, February 2, under the chairmanship of E. A. Davis, Westinghouse Electric Corp. This important and timely subject is being developed by the Joint ASTM-ASME Committee on the Effect of Temperature on the Properties of Metals. Seven papers have been prepared by experts in this field covering physical-chemical behavior, properties of oxidation-resistant scales, structure of oxides, oxidation, the influence of thin surface films on mechanical properties of metal crystals, effect of environment on the tensile creep properties, and intergranular oxidation. Interested visitors will be welcome to attend.

ASTM is a non-profit, national technical society organized in 1898 for the "promotion of knowledge of materials of engineering and standardization of specifications and methods of testing" with headquarters in Philadelphia. Norman L. Mochel, manager, Metallurgical Engineering, Westinghouse Electric Corp., Philadelphia, is president of the Society and Robert J. Painter, also of Philadelphia, is executive secretary.

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Power Show

(Continued from Page 10)

purpose. One such was in operation at the show. It is a two-stage unit consisting of two single-stage rotary pumps of the sliding-vane type, with an intercooler mounted in between. The exhibit was remarkable in that it is the first unit of its type designed specifically for the designated purpose. It is remarkable too as an example of forthright engineering-development, inasmuch as the characteristic performance of the prototype unit was being logged no further back than last spring.

Automation, which was the subject of an all-day conference of the Instrument Society of America, during the Show, was reflected at many of the displays. A large number of idicating and regulating appliances are adapted to remote indication or control, as the case may be, by transmission of pneumatic or hydraulic pressures, or by electric currents or impulses. Groups of such appliances are frequently tied into control centers where conditions at scattered points may be observed at one time and corrections made as required in the interflow of processing events. The observations may be "reported" on separate dials or moving charts; they may be combined into a single graph such as that of the scanner displayed by one exhibitor which may be extended to respond to signals from 20 different points, or 200.

Another step in the treatment of signals from multiple points introduced the digital converter, which another exhibitor displayed. This instrument incorporates a group of elemental units, each of which responds to a signal impulse by moving a printing wheel into a corresponding position. A gang of such units constitutes an elementary recording machine. Associated with clock work and other printing wheels, it records the day and the time. Associated with other suitable gearing, it can add, multiply or store data, feed into a computor, code it on punch cards, or acutate an electric typewriter or a teletype machine for permanent records or distant communication.

Drives, both speed reducing and variable speed, made up a well filled classification at the Exposition. There were about a dozen displays of electric motored units and an equal number mechanical. One of the latter offered what appeared to be an entirely new solution of the infinitely-variable friction drive problem. Driving and driven members are opposed beveled discs, in contact with which are several relatively large balls, held in contact with the discs by an outer floating ring. Contact pressure is maintained by torque-responsive control of the spacing between the discs. The balls are mounted on axles which are varied in angular relation to the driving axis, so that when parallel with it the speed ratio is 1, but when angled the speed is increased or reduced, according to the tilt of the axle.

The array of electric motors at the show covered every conceivable application for power plant and mechanical engineering uses. To meet the requirements of plants where operating conditions are rough, one manufacturer showed a "chemical" motor, especially protected from the effects of corrosion and also explosion proof. To meet the call for speed variation, a second brought forth an a-c adjustable-speed drive consisting of a constant-speed squirrel-cage motor driving an eddy-current clutch with excitation from a permanent magnet generator on the output shaft.

For machine drives requiring frequent quick stops and starts, as in textile, watch, pen and pencil, telephone, radio and "TV" equipment and many other manufacturing lines, a third exhibitor showed a so-called power transmitter. This unit consists of a totally enclosed and fully protected fan-cooled motor, having a high inertia flywheel which runs constantly and a driven end incorporating clutch and brake. The start-stop action may be manually operated, or worked by cam or screw from the driven machine.

A reliable, simple, low-cost, adjustable speed method of operating d-c motors from a-c lines combines the convenience of alternating current power supply with the excellent starting characteristics and good regulation of direct-current shunt and compound-wound motors.

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Selenium rectifiers in variety were displayed by a specialist in that field showing general purpose battery chargers and diesel engine starters. A special application for such equipment is a heavy duty mobile unit for aircraft engine starting, ground operation of bomb-bay doors, other components and similar d-c power needs in hangars, airfields and aircraft factories.

One of the larger manufacturers of hydraulic and air equipment exhibited an extensive line of pumps and controls; pumps developed for road machinery, earth-moving and materials handling equipment, duty which involves rough work; another line for high-low pressure systems for hydraulic presses, die casting, plastic molding machines and machine tools. There was also an exhibit of pumps for automatic lubrication of machine tools and other hydraulically powered equipment. Another of proportioning pumps which incorporate an accurate method of feed control by adjusting the stroke of the piston while in motion.

Among the numerous exhibits of metals at the Exposition, two newcomers made their first appearance. One represented the emergence of powder metals from their most familiar role in self-lubricating bearings to a new status as structural materials. The principle and general method of production is the same with the new steel "Oilite," as with the well-known brasses and bronzes, mixture and compression into molds of finely divided metal aggregates, consolidation by sintering. The new steel-base powder metal, however, has rather remarkable properties with emphasis on high ductility, high impact resistance and high fatigue. It is produced in three grades with physicals showing a range of 35,000 to 120,000 psi ultimate strength; elongations in a range of 10 to 1; compressive strength 25,000 to 150,000 psi; hardness 30-50 Rb, to 35-50 Rc.

The second newcomer, also in the family of powder metals, is called a plastic steel, since it is composed of 20% cold setting resinous binder, 80% steel powder aggregate plus a special hardening agent. In paste form it can be molded like putty, stiffening in one hour, hardening in two hours in air without shrinkage. In fluid form it can be cast and will permanently bond to wood, metal, even glass; it can also be cast in waxed molds. So formed it can be sawed, drilled, threaded, machined like steel. As to its properties, it is 100 percent solid; tensile strength, 10,000 psi; flexural, 13,000 psi; impact, 0.7-0.8 ft. lb. per in. of notch, Izod; hardness, 75 Rf. As to its uses at seven months since it was put on the market, one manufacturer using it in production of light stampings, reports that a set of four forming dies cost $450, whereas one set of steel dies for the same part cost $2,400.

Northwestern Holds Evening C. E. Courses

Courses in civil engineering are being offered for the first time this winter in the evening study program at Northwestern University's technological institute.

Courses will continue to be offered in chemical, electrical, and mechanical engineering.

The evening and Saturday morning courses are designed for qualified practicing engineers with professional and family responsibilities. While continuing full-time jobs in industry, graduates of engineering or applied sciences can register for fully accredited courses either as special students or as candidates for the master's degree. They can also pursue research or investigation for an advanced degree.

Last fall more than 70 practicing engineers studied in the program.

Classes will meet once a week in the technological institute, Sheridan rd. at Noyes st., Evanston, and will carry up to two graduate units of credit.

The new civil engineering courses are sanitary chemistry, reinforced concrete design, groundwater flow and seepage, and flow in open channels.

In chemical engineering, courses will be offered in unit operations, heat transmission, and applied thermodynamics. Available in mechanical engineering

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On Training —
Letters from Leaders

In the last issue of Midwest Engineer we published another of about thirty letters received from leaders of Chicago-area firms concerning shortcomings noted in the engineers in their employ. Many of the letters also suggested what the engineers should do to correct their deficiencies.

Significantly, the engineer's technical training is generally considered adequate. In the broad area of Human Relations, however, engineers seem often to be "under achievers," according to the viewpoint of the industrial leaders as reflected in their letters.

We are printing another of these letters in this issue, as we shall do in future issues. Although the letters may be of greatest value to the younger engineers, we hope that all of the engineers who read them will benefit.

Here, then, is the next letter:

Dear Mr. Becker:

Your letter of August 31, addressed to Mr. ..... has been referred to my attention. Your question is a broad one, and so far as my observation is concerned, there are as many deficiencies in engineers as there are individuals and you usually do not find the same deficiencies in all engineers. To give the question justice, would require the writing of a book, and since generalizations are inaccurate and suitable qualifications would require specific examples, which, in turn, lead to voluminous material, there seems to be no happy answer to your request. Obviously, deficiencies are not the exclusive limiting characteristic of engineers; an equal tendency toward deficiencies will be found among executives. The tendency in industry to place engineers in a special category of the human family seems to be undesirable; and the profound assumption on the part of educators that they should serve up broadly trained engineers without serious deficiency appeals to me as very much over-optimistic. I think the colleges are doing a sound job of training the men in the basic tools of the profession. Let the college stick to fundamentals and leave something for industry and for the engineering candidate to do after graduation.

Certainly, there are engineers who never acquire a broad commercial point of view. There are other engineers who never learn how to work in a team, and still others who are perfectionists to the point of complete impracticability. There is no magic formula for the correction of attitudes and personality fixations, and it is rather late in the day to try psychotherapy treatment at the college level.

My personal experience includes seventeen years of college teaching and ten years of industrial work at the executive level. Based upon experience in both fields, I am inclined to conclude that most colleges are doing a better job of training engineering students in the fundamentals than the job performed by manufacturers in carrying the embryo engineers on through the next stages of professional training. From the industrial point of view, I could make some very pointed suggestions about the needed training which should be added to the engineering curricula of the country, but from the educational point of view, I could poke the suggestions full of holes. You can understand my dilemma and I am afraid that my contribution will be neither helpful nor illustrating.

Very truly yours,
(Signed)

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OVER THE MANAGER'S DESK

As the New Year gets underway, there is only one thing, we in Engineering Societies Personnel Service, Inc., can say and that is

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Bonnell H. Allen

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Is Flight Speed-Limit in Sight?

The men who engineer and plot advanced theory for tomorrow's aircraft disagreed Dec. 1 on whether the speed limit to man's flight was already in sight.

They agreed, though, that research on the effects of high-speed, high-altitude flight lagged behind the design of aircraft to fly in the thermal barrier.

The thermal barrier applies to the high temperature met by aircraft beyond Mach 2 (twice the velocity of sound).

Nine technical papers on thermal flight problems were delivered at the annual meeting of the American Society of Mechanical Engineers in the Hotel Statler. Nuclear-powered aircraft, pilotless aircraft, and the effect of thermal flights on man, equipment, and aircraft structure were among the subjects covered.

"Startling" problems are presented by supersonic heating, the scientists said. For example, they pointed out, at Mach 5 aluminum melts, and at Mach 6 steel melts.

Dr. George Gerard, assistant director of the Research Division of the New York University College of Engineering, and George T. Hayes of Stanford Research Institute stated in a published summary of the nine papers that there are optimistic and pessimistic views of thermal barrier effects on aircraft performance.

Optimists, they said, believe that aircraft without radical design changes, following carefully prescribed flight paths, can weather thermal flight conditions. A suitably designed plane or missile, say the optimists, "may fly very fast at extreme altitude where the density of air is practically zero and then proceed at reduced speed while passing through lower altitudes."

The more pessimistic contend that the damaging effect of heating during thermal flight can be prevented for only short-periods. "Sooner or later," says this group, "the aircraft engineer will have to face the task of designing the aircraft to carry loads while hot"—that is, while the aircraft body and equipment are at temperatures of anywhere from 200 to 1600 degrees F. or more.

In pilotless aircraft-missiles, rockets, etc.—heat effects might be alleviated by allowing certain parts of the missile to melt, Charles H. McLellan of the National Advisory Committee for Aeronautics pointed out. The melting process would be similar to that of nature in meteorites that fall to earth. Melting in meteorites occurs at the surface; the interior remains relatively cool.

Describing results of research in NYU's Engineering Research Division on structural aspects of thermal flight, Dr. Gerard foresaw a possible upper limit, with present engineering materials, of about Mach 3.5 speed for any sustained period of time.

At this speed, the increased weight necessary to make the plane structurally sound in the face of 800 degrees F., for example, would render the aircraft impractical, he stated. A Mach 3.5 fighter might weigh as much as current heavy bombers.

There are two approaches to design of high-speed piloted aircraft, said Harold W. Adams of Douglas Aircraft. One is to design the aircraft to endure the high temperatures. The other is to keep the airplane cool so that conventional designs may be used.

The first course "presents almost insurmountable problems at the present time," even at moderately high Mach numbers, he said. Possibilities for the second course include cooling by air-cycle systems, water-evaporation systems, and fuel cooling (the latter only in chemically fueled aircraft).

The need for closer cooperation between engineering and the biological sciences was emphasized by Dr. Ross A. McFarland of the Harvard School of Public Health. Despite the effectiveness of cabin-pressurization and pressure-breathing equipment, such factors as sudden loss of pressure and acceleration during combat maneuvers may result in loss of pilot consciousness, or in death. Air crews should be indoctrinated to understand their own physical limitations while in flight, he added. He pointed out that a supersonic aircraft may cover a mile or more between the time the pilot sees a situation and the time he moves his muscles to respond to it.

Among other points raised in the thermal barrier symposium were:

1. The heat problem in turbo-jets, most popular type of engine for supersonic flight, is further complicated by blade-flutter. If vibration or heat damages even one of the 1,000 blades of a turbo-jet's compressor, the engine may be wrecked completely.

2. Engineers would like to use the large fuel supplies carried by supersonic aircraft as a "sink" to draw up the excess heat. However, "the fuel system designer has more than his share of problems under conditions of supersonic flight without anyone else adding heat to the fuel." Instead, artificial heat "sinks" may have to be created, and water still seems to be the most efficient cooling agent.

3. Time is an essential factor in determining stresses in supersonic aircraft parts, so essential that "the designer has to get used to the idea that each structural element be calculated for a definite lifetime." This leads to the suggestion of parts or whole planes that will be replaced rapidly, perhaps as often as after each flight or longer than a few minutes.

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Strauss Announces Atom Power Contract

Lewis B. Strauss, Chairman of the U. S. Atomic Energy Commission, announced Dec. 15 award of a lump-sum contract to design, build, and test operate a prototype "package" nuclear power plant for military use to the American Locomotive Company. The contract, Strauss said, is the first of this kind to be let on a fixed-price basis and as such is an important step in the development of power reactor technology.

Of 18 proposals submitted by industrial firms, the company's was the most favorable to the government from the standpoint of price, excellence of design, and responsiveness to other terms of the AEC's invitation. The contract price is $2,096,753. This cost will be shared by the AEC and the Department of the Army on an approximately equal basis.

The plant which has been designated the Army Package Power Reactor (APPR) will be built to provide construction, operation and maintenance information and to demonstrate both the capabilities and limitations of such plants. The design of the APPR is based on studies by the Oak Ridge National Laboratory which established the feasibility of developing such a plant.

The project as recently described by Maj. Gen. Samuel D. Sturgis, Army Chief of Engineers, is designed to develop a power reactor plant, with components transportable by air, which can be used at remote bases. Use of such a plant would reduce the amount of bulky conventional fuels that must be transported to support a military operation. The prototype will have a capacity of about 2,000 kilowatts of electricity. Future plants based on this experiment could be built to provide space heating in addition to electricity. The prototype will be built at Fort Belvoir, Virginia, site of the Army Corps of Engineers Training Center, where it will provide a training facility which can be integrated into the Engineer Training program of the Army.

The contract award was made by the AEC's Chicago Operations Office which has been assigned the responsibility of administering the contract.

In commenting on the AEC award, Perry T. Egbert, ALCO President, has this to say:

"ALCO has been building atomic energy products since 1949 and has supplied major components for the USS NAUTILUS and for basic atomic energy producing plants. The assignment of designing and building the first Atomic Energy Package Power Plant, therefore, is a responsibility we welcome. This prototype of a complete power plant, which can be transported and erected anywhere in the world, should contribute materially to the objective of utilizing atomic energy commercially."

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WSE Applications

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

108-54 J. C. Smith, General Div. Engineer, Commonwealth Edison Co., 72 W. Adams St.

109-54 Richard F. Catchpole, Building Code Consultant, National Lumber Manufacturers' Association, 176 W. Adams St.

110-54 Robert F. Born; Engr., Power & Serv. Facilities, Mech.; Western Electric Co., Inc., Hawthorne Station.

111-54 James P. Ringley, Permit & License Agent, Commonwealth Edison Co., 72 W. Adams St.

112-54 Thomas W. Lowe; Assistant Plant Engineer, Belden Manufacturing Co., 4647 W. Van Buren St.

113-54 Donald F. Reinert, Sanitary & Planning Engineer, Chicago Regional Planning Association, 79 W. Monroe St.

114-54 Thomas F. Jackson, Jr., Sales Engineer, Anaconda Wire & Cable Co., 20 N. Wacker Dr.

115-54 John A. Jacobson, Soils & Foundation Engineer; DeLeuw, Cather & Company, 150 N. Wacker Dr.

116-54 James F. LaRue, Supt. Constr'n. & Mtce., Phillips Petroleum Co., 7 S. Dearborn St.

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Economical Hints

A prominent display of tool and equipment costs, in the form of "price tags" hung or painted on walls or equipment, is contributing significantly to reductions in breakage of machines and tools in several plants, *Construction Methods and Equipment,* McGraw-Hill publication, says. In one Michigan plant, tool breakage was cut 20 per cent.

Many Math Teachers Held Poorly Trained

More than 100,000 students in the nation's high schools last Fall enrolled in mathematics and science classes presided over by inadequately trained teachers. The danger to the future of the country's technology and to its national security in the serious shortage of properly prepared teachers was emphasized in a statement issued Dec. 12 by the Engineering Manpower Commission of New York, and the Scientific Manpower Commission of Washington, D. C.

The statement of the Commissions follows a recent report of their Joint Committee on High School Teachers of Science, which has been engaged in a survey of conditions and in a study of means of correcting the situation and alleviating the shortage of science teachers and of assuring their proper training.

The joint report urged, among other things, that "engineers and scientists in industry advise local high school teachers and provide summer jobs to give them experience in their specialties as well as additional income."

The two Commissions have been the more concerned over the shortage of students and properly prepared teachers in these fields because, while United States education has been falling behind in these respects, Russia has been placing increasing emphasis on engineering and science in its education program and has enrolled in recent years a tremendous number of students of technology.

The EMC-SMC statement said:

"The professional engineering and scientific societies of the United States, which have been calling attention for some time to the shortage of manpower in these fields, now find it necessary to emphasize the most acute shortage of all, the shortage of adequately trained high school teachers of science and mathematics.

"There are many well-prepared teachers of science and mathematics in our high schools. But, apart from these, there also have been registered this Fall (1954) more than 100,000 students in high school science and mathematics classes who are being taught by teachers

who have not been trained adequately. This confronts the nation with a dangerous situation in its need of able technologists not only in time of peace but also in contributing to the assurance of the national security against any possible future aggression.

"Education departments and school superintendents throughout the country have been confronted with this problem for a long time. Since the early years following the recent World War, the elementary schools population has been increasing rapidly, pointing to an early increase in attendance at secondary schools. The task of getting properly equipped teachers in sufficient numbers to instruct these growing numbers of students has been most troublesome for education authorities.

"In fact, there now is a high school influx of students. The need for more teachers is evident. Teachers in the 9th to 12th grades require more training than teachers in the lower classes. As teachers do obtain better training, they find that their improved preparation qualifies them for outside jobs that pay higher than teaching. In consequence, only half the young men and women who earn teaching certificates in science and mathematics actually teach.

"The Engineering Manpower Commission and the Scientific Manpower Commission believe the problem is one the schools should not have to face alone. The Joint Committee of the two Commissions has proposed an action program for their constituent professional engineering and scientific societies, which have a combined total membership of 320,000 and have local sections in all parts of the United States.

"The committee urges engineers and scientists in industry to advise high school teachers and to provide summer jobs that will give them realistic experience in their specialties and, in addition, will assure them needed earnings. College authorities are urged to promote high school teaching as a career and to provide more courses for teachers.

"Professional societies are asked to assist in setting up conferences, institutes, symposia, fellowships and other activities that would improve the ability of teachers. They are advised to assist in arranging plant and laboratory visits by teachers and students and in obtaining adequate libraries and laboratory facilities. Societies and their members are encouraged to promote and participate in guidance services for high school students, in which the requisite qualifications and the opportunities for, as well as the advantages and difficulties of careers in engineering, science and science teaching are presented realistically."

In announcing the findings and recommendations of the Joint Committee, William T. Cavanaugh, executive secretary of the Engineering Manpower Commission said:

"This is a new field of activity for the engineering societies, but we are confident the engineering approach will help the schools solve a problem that is more urgent than the need for more buildings and equipment. Without good teachers we have a school building, not a school. The Joint Committee of the two Commissions believes its recommendations will help materially in answering the question of what can be done to assist high school teachers of science and mathematics, thus encouraging them to remain in teaching and in answering the question of what can be done to increase the number of adequately trained teachers of these subjects."

Commenting on the survey and the report, Howard A. Meyerhoff, director of the Scientific Manpower Commission said:

"We can paraphrase the old story of the lost nail. Thus, for the want of a teacher a scientist was lost. For the want of a scientist an invention was lost. And for the want of technology the nation was lost. Perhaps we should head it with—for the want of a living wage, the teacher was lost. There seems to be the practical starting point."

Wonderful TV

Industrial television is now being used to spot empty spaces in car parking lots and as a classroom aid in teaching dental surgery, according to *Electronics*, McGraw-Hill publication.

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ASHAE To Meet in Philadelphia

The 61st Annual Meeting of the American Society of Heating and Ventilating Engineers, and the first under its new name: American Society of Heating and Air-Conditioning Engineers, will open officially at the Bellevue-Stratford Hotel, Philadelphia, on Jan. 24. The same afternoon the 12th International Heating and Air Conditioning Exposition, sponsored by ASHAE, will open at the Commercial Museum with over 400 manufacturers exhibiting the latest in heating and air conditioning equipment.

The technical sessions of the Society will open each day, Monday through Thursday, at 9:30 a.m. Except for the Monday meeting in the Clover Room, all sessions will be held in the ballroom. The Exposition will be open Monday through Friday from noon until 10:00 p.m. except the last day when the Exposition closes at 6:00 p.m.

An excellent selection of technical papers for the four technical sessions has been arranged by the Program and Papers Committee under the chairmanship of B. H. Spurlock, Jr., professor in the Department of Mechanical Engineering, University of Colorado.

The first paper, by C. P. Yaglou, professor of Industrial Hygiene, Harvard School of Public Health, is a report on experimentation in determining the ventilation requirements necessary for removing tobacco smoke from a room. Tests showed that when less than 15 cubic feet per minute, per smoker, of fresh air is introduced into the room, occupants complained of eye sting, headache, coughing and nose irritation.

In another paper, the use of a centrifuge for measuring the size, distribution, and amount of dust particles in a given air sample, will be described. The paper deals wth the apparatus used, the method and the basic theory of the test. A future paper will describe the results of the application of this method of measuring dust particles.

H. A. Endres will read the closing paper of the Monday morning session. It was prepared by Mr. Endres, W. T. Van Orman and R. P. Carter, Jr., and it describes a method of testing panel-type air cleaners under *use conditions*. They feel that passing a synthetic test dust through the air cleaner does not give as effective a test as when using real dust under actual working conditions.

The first paper on Tuesday morning, delivered by L. F. Schutrum, research supervisor of the ASHAE Laboratory, was written by John Vouris, T. C. Min and Mr. Schutrum as an ASHAE Laboratory paper on panel heating and cooling. It includes a description of temperature distribution in a room cooled by ceiling panels and observations on how rooms cooled in this way are the inverse of rooms heated by a warm floor.

Another ASHAE Laboratory paper, by A. Umur, G. V. Parmelee and L. F. Schutrum, is a report on the measurement of angular emissivity. It describes the equipment set up for measuring the heat absorbing properties of materials such as copper, and paints, and the effects of radiation at various angles. Up to 50 degrees from perpendicular, the angle made no difference on practically all materials, but beyond 50 degrees the ability to absorb heat lessened as the angle widened.

The final Tuesday paper, by H. B. Nottage and G. V. Parmelee, also is an ASHAE Laboratory paper and deals with a continuation of the study of the basic problem in which the heat load is determined by the application of electric circuits to the principal sources of heat in a building. The paper explains how an electric circuit can be used as a source of heat energy in calculating heat loads.

A discussion of the thermal conductivity of gas in insulating materials is the subject of a paper prepared by R. M. Lander as the first presentation Wednesday morning. By substituting other gases such as carbon dioxide and freon for air, the author was able to show that the thermal conductivity of materials decreased and the insulating property improved when the change was made.

M. L. Ghai and R. Sundaram will report a study of the commonly used method for measuring heat loads, and believe it can be improved by making

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use of an outside design temperature, which is a synthetic temperature arrived at by combining construction material characteristics with actual weather temperature.

Describing the study of liquid-to-liquid transfer of heat, F. W. Hutchinson, L. J. La Tart and N. W. Smith tell of their laboratory equipment setup for measuring the amount of heat which passes through a water heater when the water is moving fast on the inside and slowly on the outside. Data obtained will be helpful in predicting the amount of surface needed on hot water heaters used for this purpose.

A study of the amount of radiation realized on cloudless days makes up an ASHAE cooperative paper which is the last to be delivered on Wednesday. Prepared by R. C. Jordan and J. L. Threlkeld, it tells of work done at the University of Minnesota on the study of the amount of heat received from the sun by horizontal and vertical surfaces from a southerly direction at different angles.

An ASHAE cooperative paper with Case Institute, by Alfred Koestel, will be the first presented at the concluding session Thursday morning. It correlates studies made of the path of heated and cooled jets of air projected horizontally. Koestel has worked up an equation for predicting this path, and he proves similar facts by other equations.

In discussing the air conditioning of multi-room buildings, R. W. Waterfill feels that a suitable installation is a central heating and cooling system which uses a double-duct system handling air at different temperatures which are then mixed at the point of usage.

A report on the installation of a summer cooling unit in a residential structure at the University of Illinois, prepared by H. T. Gilkey and S. Konzo, presents a record of the changes which took place when the unit was operated constantly and intermittently. It was found that more moisture is removed at the intermittent speed and that by increasing the amount of air through use of a faster speed no change was effected. It also was learned that the load on the installation seemed related to the amount of time the outside temperature exceeded 65 F.

New Jet Research Facilities Announced

Plans to build new jet engine research and development facilities costing more than $12½ million have been announced by Westinghouse Electric Corporation. The expansion program was announced by W. W. Smith, manager of the Westinghouse Aviation Gas Turbine Division, Kansas City, Mo.

The new facilities—which include both high- and low-power laboratories and an experimental engineering shop—will be located at the present site of the huge jet engine plant south of Kansas City. A portion of the more than 230,000 square foot laboratory will be made available within the confines of the existing 80-acre building. The high-power and fuel testing laboratories will be constructed adjacent to and north of the present structure. (Construction on this phase of the expansion is expected to be started sometime this winter.)

Smith also announced that the firm of Sanderson and Porter of New York is already at work on the architectural and engineering phases of the high power laboratory, and will be construction agents for all new construction involved.

The new laboratories will provide for research and development testing on components of new jet designs, and for development of improvements in existing jet engines. The experimental shop will manufacture newly designed components, as well as complete experimental engine models.

"The need for more rapid development of turbojet aircraft engines has accented the necessity for immediate expansion of Westinghouse development facilities," Mr. Smith said. "The addition of these facilities will be another step forward toward a completely integrated jet engine research, development and production center at our Kansas City plant."

The entire operation will be part of the division engineering department and will come under the supervision of Allan Chilton, chief engineer.

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Eminent Woman To Talk at Luncheon

"YOU CAN WRITE A POEM" will be the subject of Gail Brook Burket, guest speaker at the regular Wednesday noon luncheon, Jan. 26 at 12:15 P.M. Some time ago WSE's Professional Women's Division presented a well-known artist as its speaker at a noon luncheon. The response was tremendous, proving that engineers are cultured and

Gail Brook Burket

interested in the so-called finer things of life, even to the point of creating them personally. Who knows but that there are those among WSE members who may have a secret yen to express themselves in other forms than those of staid technical reports. Therefore the Women's Division has gotten an expert on the subject of poetry! Come along members, they invite; bring your guests —get the facts!

Mrs. Walter C. Burket of Evanston is the wife of a surgeon and the mother of three daughters. She is a graduate of the University of Illinois, received her master's degree from Northwestern University and is a member of Phi Beta Kappa.

As the result of teaching a course in writing for hospitalized veterans, sponsored nationally by Theta Sigma Phi, national professional organization for women in journalism, Mrs. Burket has written a book entitled *You Can Write a Poem*. It is being used now in courses in veterans' hospitals. Mrs. Burket has also published two collections of poetry, *Courage Beloved* and *Blue Print for Peace*. Further, *Manners Please* for the youngsters, and *Let's Be Popular* for teen-agers, along with poems and short stories in many national publications, have been written by her.

IIT Head Makes A Recommendation

Corporate contributions to private higher education should be regarded as "factory expense" rather than as a charity, Dr. John T. Rettaliata, MWSE, president of Illinois Institute of Technology, said in his annual report.

Pointing out that this factor of self-interest is being recognized to an increasing extent, Dr. Rettaliata stated that "business statesmen know that no industry can be stronger than the intellectual level of its personnel."

"Competent, literate, and well-informed employes are a company's principal asset. These qualities are obtained through education, the essential ingredient in industrial achievement," he declared.

Conversely, he stated, industry enhances the reputation of the academic institution through development of the discoveries of fundamental research in the university laboratory.

Thus, he added, it was mutually desirable and necessary for business to support privately financed institutions.

He predicted that, with the establishment of better communication between education and industry, greater support of education is more likely.

"Education's problems are its own," he said, "but industry can and will help in their solution when it understands why it should . . . and it is primarily education's job to see that this understanding is accomplished."

In technology, business has a new tool at its command, he declared.

"Business approaches the position where it determines its own destiny," Dr. Rettaliata continued.

"Now, through technology and research, new products and markets are created. Consumer demand can be influenced. If the product is made attractive enough, and useful enough, the public will want to buy."

He noted that corporate charitable contributions for all purposes are less than 1 per cent of net earnings before taxes, and that the allowable tax-exempt figure is 5 per cent.

For operation on an effectual basis the colleges need corporate support of about one-half of 1 per cent, or approximately one-quarter billion dollars a year, Dr. Rettaliata stated.

Another approach to the solution of the financial problems of private education institutions lies in proposals that the cost of education to the individual be allowed as an income tax deduction, he explained.

Dr. Rettaliata pointed out that if such an arrangement were adopted the cost differential would be reduced between the private institution, with its necessarily higher tuition, and the tax-supported school.

"This would have the democratic effect of permitting the student from a low income family the increased opportunity of attending an independent college if he so desired," he concluded.

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Reviews of Technical Books

Conveyors

Conveyors and Related Equipment, by Wilbur G. Hudson, John Wiley & Sons, New York. Third edition, 1954. 524 pages. Price $9.00.

Considerably revised, this book takes into account the improvements in the construction of conveyor belts during the last ten years, and gives the current outlook on the saving of time, storage space, and labor costs.

The new material deals with modern belt construction and dynamatic drive control, today's costs and designs of silos, bins, and bunkers, developments in boiler house coal handling and storage, dust explosion hazards, the hydraulic transportation of coal in pipelines, and the role of the two-way radio in expanding the applications of motorized industrial trucks. The new edition also makes available for the first time a published analysis of recent developments in pneumatic conveying and the resulting benefits to cargo shipping.

Mr. Hudson concentrates on those machines which figure most importantly in average problems. After pertinent historical outlines, he goes into the technicalities of layout, maintenance suggestions, and performance possibilities, including the applications and limitations of each machine. Among the machines covered are screw, flight, and apron conveyors, the bucket elevator, the skip hoist, aerial tramways, crushers, hammermills, pulverizers, and others.

A consulting engineer, Mr. Hudson specializes in materials handling engineers. He was formerly associated with the Curtiss Airports Corporation and with the Link Belt Company where he was chief engineer.

R.C.

Strength of Materials

Strength of Materials, J. Marin, and J. A. Sauer, The MacMillan Company, New York, N. Y. Second Edition, 1954. 518 pages. Price $6.75.

The material of this book has been selected for use as a text in a first course in Strength of Materials. The second edition retains the main features of the first edition. With the treatment of each type of stress the mechanical properties of the materials are considered. The correlation of stress analysis, mechanical properties and design are featured to prepare the student more adequately for the study of machine, structural, and aircraft design.

The text contains parts on simple stresses, statically indeterminate stresses, combined stresses and special topics. The part on special topics contains consideration of riveted and welded joints, special problems on bending, members subjected to fatigue and impact loads, temperature and creep properties of materials and experimental stress analysis.

B.A.W., W.S.E.

Applied Hydraulics

A Treatise on Applied Hydraulics, by Herbert Addison, John Wiley & Sons, New York. Fourth edition, 1954. 724 pages. Price $9.50.

Revised to include the advances made in design and construction during the past nine years, the new book is concerned primarily with direct explanations of hydraulic principles and again serves as a guide to the scattered literature on the subject. In addition to the up-to-date material which has been incorporated into the body of the book, the new edition includes a collection of biographical notes about some of the outstanding personalities who have contributed to the advancement of hydraulics.

The first part of the book, devoted to principles, covers liquids and their properties, liquids at rest and in motion, dynamic pressure of liquids, radial and rotary motion of fluids, and flow through orifices, over wires, through closed conduits, and along open channels. In the second section on practical applications, Addison deals with pipes and pipe systems, control of water in open channels, construction and performance of hydraulic turbines, pumping machinery, and related details.

Professor Addison was formerly at Fouad I University in Giza, Egypt. His earlier book, *Hydraulic Measurements* (second edition) was published in 1946.

R.C.

Highway Engineering

Highway Engineering, by Laurence I. Hewes and Clarkson H. Oglesby, John Wiley & Sons, New York. 1954. 628 pages. Price $8.00.

Covering both engineering design and construction practices, the book is balanced in favor of the former. The principles of each topic are developed first and current practice then explained in terms of these principles. Pertinent research findings and their implications are also included for each topic.

In the light of modern trends, the authors have given greater than usual attention to the questions of highway economy and finance, rights of way, drainage, and traffic engineering. The chapters on soils, bases, and pavements concentrate primarily on design techniques and the research findings that affect them.

The late Dr. Hewes, author of *American Highway Practice* an earlier Wiley publication, was chief of the Western Headquarters of the U. S. Bureau of Public Roads. Professor Oglesby is with the department of Civil Engineering at Stanford University. A practicing engineer for many years, he was formerly with the Arizona Highway Department.

R.C.

Military-Industry Meet Set Feb. 10

To consider the dangerous shortage of engineers as it affects the military defense of the nation, a Military-Industry Conference is being held in Chicago, Feb. 10-11, at the Conrad Hilton Hotel.

Lenox R. Lohr, MWSE, president of The Society of Military Engineers, the sponsoring military organization, explains the need for this conference:

"The number of engineers and scientists graduating from our technical schools is considerably less than that needed to meet the demand. American industry, school faculties and the Armed Forces are increasingly feeling the shortage of technically trained manpower which could well be the deciding factor in another national emergency. Well qualified committees and commissions are studying this entire situation, and their reports are receiving more and more attention from news media.

"With the expiration of the Selective Service law in June, 1955, another bill dealing with military manpower will be introduced in the Congress. This bill will have far-reaching effects on the future welfare of this country. Certainly, it will require exhaustive reconsideration of our entire manpower policy by the Congress.

The Society of American Military Engineers with the cooperation of those in the technical branches of the Armed Forces, American industry, technical education, and engineering and scientific societies including the Western Society of Engineers, will bring together high ranking representation from all of these groups and organizations at this conference.

"This conference has received the attention of a number of experienced educators and military and industrial men. It is their united opinion that people occupying positions of responsibility in our legislative, military, educational and industrial life could well come together to direct their thinking to the utilization of our especially trained manpower and skilled craftsmen in ways which will best serve the nation.

"There is great public interest in our comparative world position in technological matters, as well as in all matters concerning military service. This interest, plus the varied viewpoints and responsible positions of those in attendance at this conference, should result in the conference serving as an unusual source of reliable public information. In addition, specific recommendations coming from this conference should receive most careful consideration of all those concerned with any phase of manpower utilization."

Charles C. Haffner, Jr., chairman of R. R. Donnelley & Sons, Chicago, and division vice-president of the National Association of Manufacturers, wrote to a number of members of the latter organization:

"As you will note . . . many prominent leaders of American industry will join with leaders of government, education and the military at a Military-Industrial conference . . . the purpose of the meeting is to discuss utilization of engineers and scientists in the Military and Industry.

"Because this meeting is of such tremendous importance to industry, I am writing to top executives of all the larger Midwest member companies of the National Association of Manufacturers in an attempt to point up the significance and serious import that this critical problem of lack of trained engineers presents to industrial management.

"During the past war the situation was alarming—it continues to be alarming in our present cold-war state—but it will be tragic if we permit this shortage of trained engineers and scientists to allow us to lose technological leadership in an atomic age.

"No longer can industry, government and the military continue a tug-of-war for the few trained engineers and scientists that are available. If we are to insure freedom and continued expansion of our economy we must meet, discuss and plan a program that will make certain a sufficient, well-trained and steady flow of competent engineers and scientists to the Military, to Government and to Industry."

Says Henry H. Armsby, chief for engineering education, Department of Health, Education and Welfare, Office of Education, Washington, D. C.:

"The shortage of engineers is a matter of serious concern to all thoughtful persons, military or civilian . . .

"The engineer shortage is roughly paralleled by shortages in practically all professional fields, notably in the health professions and in teaching. The situation calls imperatively for a realistic, practical, and democratic national policy which, while avoiding mandatory controls over the civilian population, will assure a rational supply of highly trained manpower to military and civilian activities, which are mutually interdependent in periods of partial mobilization. Such a policy will, if properly implemented, serve the best interests of the nation by insuring the most effective utilization of its most important resource—its scientific and professional manpower."

Registration at the Conference will begin on the Mezzanine Floor of the Conrad Hilton Hotel at 8:30 a.m., Thursday, Feb. 10. It will continue throughout the two-day period. Everyone planning to attend the session is required to register. Since the subject of this conference is of vital importance to all who belong to the Western Society, each member is urged to attend.

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WSE Personals

Kanwal S. Bawa, MWSE, soils and foundations engineer of Kornacker & Associates, Inc., consulting engineers, Chicago, is touring the United Kingdom, India, Thailand, and Japan during January and February.

* * *

Herman M. Ross, MWSE, has been appointed Midwest representative of Enterprise Wheel & Car Corporation of Bristol, Va., and Huntington, W. Va. Ross had recently been connected with the Economy Lamp Works of Chicago. He was graduated from the Illinois Institute of Technology, and had been active in a sales-engineering capacity for a number of years in Chicago.

* * *

J. F. Calvert, MWSE, is at present professor and head of the Electrical Engineering Department at the University of Pittsburgh. He had been a professor of electrical engineering at Northwestern since 1938 where he had been chairman of the same department since 1939.

Dr. Calvert was born at Columbia, Mo., and entered the University of Missouri. However, after only one year of attendance there, the National Guard of that state called him to active duty. Among the places where he served was France. He saw action in a number of both minor and major engagements, and received the Purple Heart for being wounded in combat. He returned to his college work and was graduated with the degree of bachelor of science in 1922 and the degree of electrical engineer in 1924. From 1924 until 1936 he was an electrical engineer for the Westinghouse Corporation.

During the period of 1932-35 he had charge of the development of insulation for large a.c. motors and generators. In 1936 he assisted in the rehabilitation of equipment damaged in the flood in Pittsburgh. The same year he received the degree of doctor of philosophy in mathematics and engineering, having been given his master's degree also at the University of Pittsburgh in 1930.

Dr. Calvert was a consultant on rural electrification projects for the state planning board of Iowa. He served on the faculty of Iowa State College during the same period, 1936 to 1938. He then joined Northwestern University where he was responsible for the design and selection of equipment for the electrical engineering department of the new Technological Institute then in the planning stage.

E. L. Roy

J. F. Calvert, MWSE

On loan to the Navy in 1941 and 1942 Dr. Calvert directed the initial construction of a ship demagnetizing station in Maryland, then went to Pearl Harbor where he was in charge of the planning and construction of the Pacific Demagnetizing Station at that location. The citation which he received from the Navy says:

"Through your devotion to duty, tireless effort, and acceptance of personal risk during and following the attack on Pearl Harbor, this station was completed by the summer of 1942, and remains the finest in all of the Pacific Ocean areas. It is equipped to furnish large amounts of electric power and has facilities for rigging and handling the largest ships in the Navy. The planning of this station is so effective that a major ship can be treated and calibrated in a few hours. During its continued use throughout the war, this efficiency has resulted in the saving of many days of vital operating time for the ships of the Pacific Fleet. The Beckoning Point station has been of special importance to the forces afloat throughout World War II. May it continue to serve as a source of pride to the Naval Ordnance Laboratory for its conception and as a constant testimonial to your exceptional engineering accomplishments."

In 1942 he returned to Northwestern where he organized the U.S. Naval Training School (radio). This school, which operated until 1944, trained over 6,000 men. Not to be partial to one service, Dr. Calvert meanwhile helped to establish the Ultra-High Frequency School of the Army Signal Corps. He also helped put the Navy V-12 program at Northwestern's Technological Institute in motion. All in all, he was responsible for education and training facilities of the Institute during World War II which cost a money outlay of more than $5 million.

Dr. Calvert is a member of a number of engineering and science organizations, and has served as chairman of the Washington Award commission administered by the Western Society of Engineers.

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Students Ask: What Should I Do When I Graduate?

"What should I do when I get out of school?"

Chicago area high school and college students will receive assistance in answering this question Saturday, March 26, at the seventh annual Career conference at Illinois Institute of Technology.

More than 100 experts from industry, the professions, and the trades will participate in panel sessions designed to counsel the youths in choosing a career.

Last year's conference—the most successful so far—attracted approximately 1,300 students from 158 high schools, junior colleges, and universities.

Albert S. Henick, chemist at the Quartermaster Food and Container Institute for the Armed Forces, Chicago, is chairman of this year's conference, being sponsored jointly by Illinois Tech, the Chicago Technical Societies council, and the Chicago Sun-Times.

The all-day program, Henick announced, will include an orientation session for all participants at 8:45 a.m., and panel sessions, lasting one hour and twenty minutes each, at 9:40 and 11:10 a.m. and 1:30 and 3 p.m.

Each session will be conducted by a chairman and a panel of experts. They will answer the students' questions and give information on requirements, trends, opportunities, and advantages and disadvantages in the fields they represent.

Other persons in charge of arrangements for this year's Career conference include:

Francis J. Hopp, chemist at Universal Oil Products company, Riverside, Ill., who is chairman of the panel committee, and Lester G. Massey, chemical engineer at Universal Oil Products, chairman of the school liaison committee. These posts are handled each year by the Chicago Technical Societies council's vocational guidance committee.

The first Career conference was held in 1948. It has been so successful and the need for career guidance has been deemed so great that other communities have patterned events similar to the ones held in the Chicago area.

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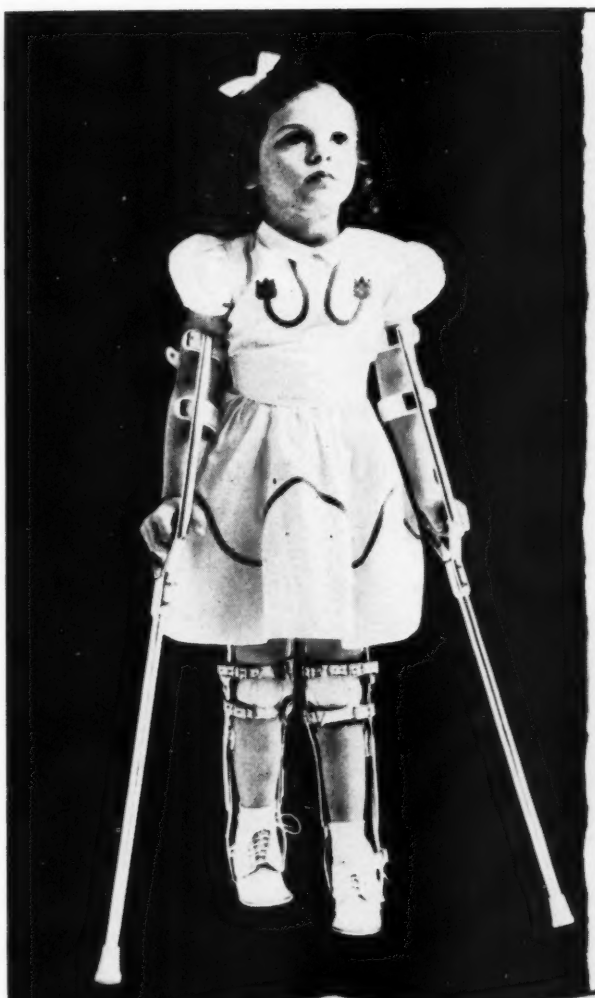

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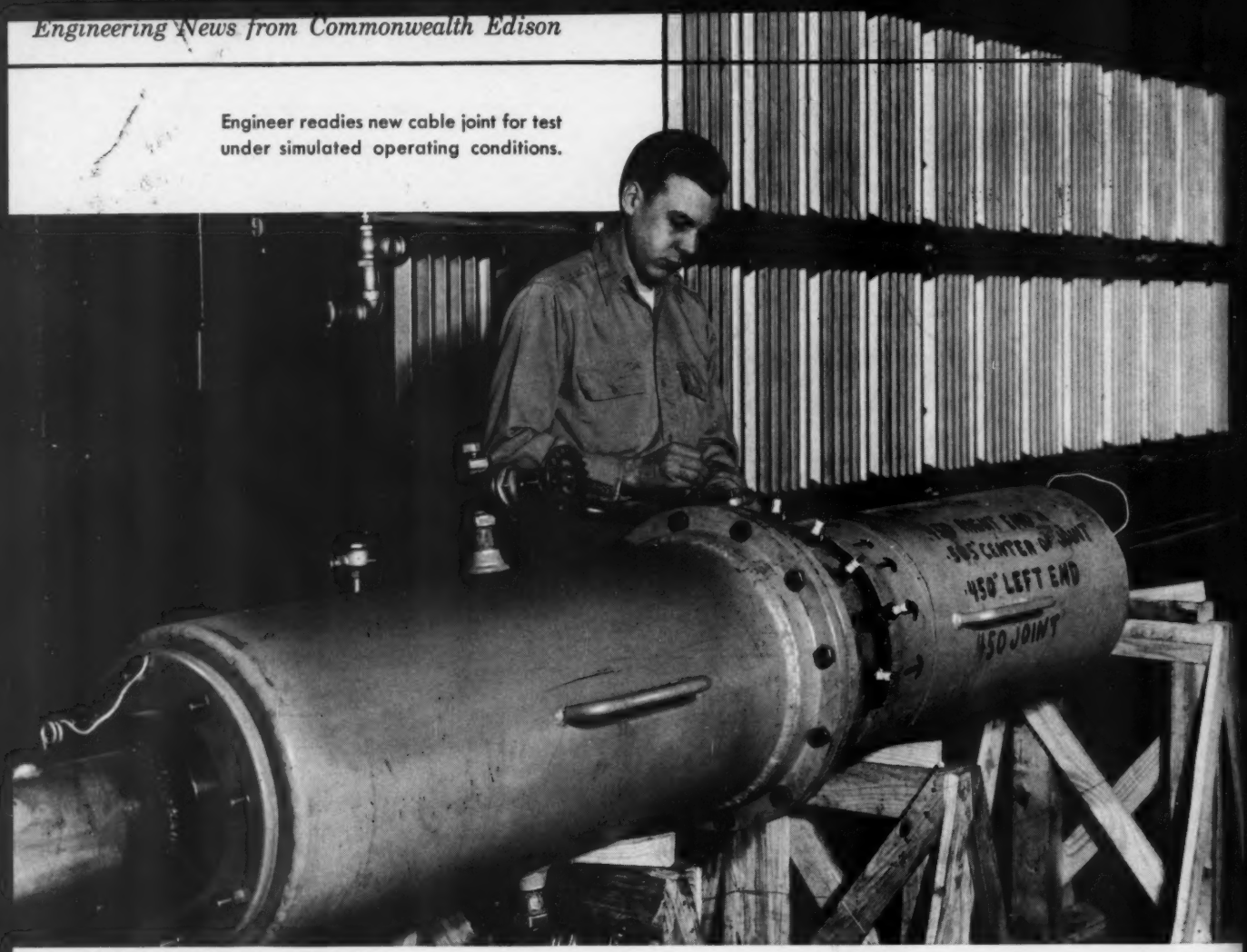
Engineering News from Commonwealth Edison



Engineer readies new cable joint for test under simulated operating conditions.

Commonwealth Edison engineers develop new techniques in underground cable

Right now, Commonwealth Edison is installing a new 138,000-volt underground pipe-type cable-line, using methods recently developed by Edison engineers. The new cable is the largest of its kind in the world today.

Commonwealth Edison engineers have long taken the lead in attacking underground line problems. In fact, back in 1927 they were the first to put high-voltage, oil-filled, lead-covered cable into commercial service. This was the world's first 138,000-volt underground installation. (Interestingly, this line is still in service, and has never had a failure.)

With experience gained from that job, and a good many others of different types, Edison engineers have pioneered in new ideas for underground lines. Many of the ideas on design of cable, accessories and on methods of installation have become standard industry practice.

Today, these engineers—civil, mechanical, and chemical as well as electrical—are working on tomorrow's problems. They're testing new types of cable, devising better splicing methods, trying out scores of new ideas that promise more economy and greater reliability. They're proud of their record, and they want to stay in front.

Ultimately, this work reflects itself in better service at low rates for the people of Chicago and Northern Illinois. That's why engineers are important in our business!

Typical cable test setup in High Voltage Testing Laboratory.

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